

**E-Coustic Solutions**

Noise Control • Sound Measurement • Consultation  
 Community • Industrial • Residential • Office • Classroom • HIPPA Oral Privacy  
 P.O. Box 1129, Okemos, MI, 48805  
 rickjames@e-coustic.com

Richard R. James  
 Principal  
 Tel: 517-507-5067  
 Fax: (866) 461-4103

September 20, 2010

Rufus E. Brown, Esq.  
 Brown & Burke  
 85 Exchange Street, Suite 201  
 P.O. Box 7530  
 Portland, ME 04101

**RE: Draft Order For Application of Spruce Mountain LLC Project**

Mr. Brown,

Per your request I have reviewed the Draft Order for the Application issued Sept. 21, 2010 by MDEP, the supporting documents from Spruce Mountain LLC's acoustical consultant, Tetra Tech, and the peer review documents from MDEP's consultant EnRad. My comments will focus on the following topics:

1. Limitations on use of ISO 9613-2 regarding:
  - a. Selection of model input parameters
  - b. Line source v. point source, and
  - c. Model Accuracy and the Stetson Mountain validation report
  - d. Atmospheric stability
2. SDRS from wind turbines,
3. Infrasound
4. Turbine configuration,
5. Use of Noise Reduction Operating Modes (NRO) for mitigation of noise during night time operation.

**LIMITATIONS ON USE OF ISO 9613-2****Model input parameters**

In the second round of modeling Tetra Tech made several changes required by MDEP's consultant

As stated in your June 23<sup>rd</sup> review report and then clarified at our June 29<sup>th</sup> meeting, you have asked Tetra Tech to reevaluate and consider incorporating additional or different assumptions into our model to increase the level of conservatism. Based on the options you presented and we discussed, we have modified the acoustic modeling input parameters as follows:

1. An additional 3 dBA engineering safety factor was added, resulting in a total 5-dBA h-factor above the overall expected mean sound levels as warranted by the turbine manufacturer. (Ground absorption was left at 0.5.) This additional level of conservatism has been added to account for potential uncertainties in predicted turbine performance in complex terrain and the sound propagation algorithms as defined under ISO 9613-2 that may result in higher than the daily expected received sound pressure levels under certain conditions.
2. The model was revised to consider sound propagation limited to standard daytime conditions to be consistent with recent Department approvals (i.e. the C<sub>min</sub> factor was removed).
3. The wind turbine sound power emission was modeled as an idealized point source in place of a distributed area source to be consistent with recent Department approvals.
4. Selected turbines have been modeled in reduced sound power mode to demonstrate compliance with noise regulations, depending on time of day. The noise-restricted operation will have a negative impact on the power output of the wind turbine. These adjustments were made with particular emphasis on meeting compliance standards at the closest receptors (10, 11 and 12) and the nearby property boundary associated with receptor 12.

Tetra Tech maintains that the original model incorporated an acceptable level of conservatism and that the additional 3-dBA safety factor is unnecessary. The conservatism of a 5-dBA safety factor was recently demonstrated by the results of post-construction monitoring of the Stetson Wind Project (Attachment A, dated July 27, 2009), where measured sound pressure levels were 2.5-8.6 dBA below sound pressure levels predicted by a model incorporating the 3-dBA safety factor. As indicated in the Oakfield Wind Project Amendment Sound Level Assessment Peer Review (Attachment B, dated December 18, 2009), the sound assessment at one of these measurement locations was conducted under "worst case" array geometry, line-of-sight and meteorological conditions.

EnRad. Tetra Tech summarizes final input settings in their report as shown in Figure 1. Item 1 of the list states that the value for ground absorption was left at 0.5 representing a condition where the ground is absorbing half of the energy incident upon it. Tetra Tech characterizes the use of the 0.5 value as being an "additional level of conservatism ... added to account for potential uncertainties in predicted turbine performance in complex terrain." Per ISO 9613-2, the algorithms do not apply when a noise source is more than 30 meters above the height of the receiver. Given that the turbine towers are taller than 30 meters and that the towers are located on a ridge above the residential properties of concern the ISO

Figure 1-Tetra Tech model input parameters

model does not apply to the type of noise source and its location with respect to receiving locations. In the Scope of the ISO standard the use of the procedures is limited to ground based noise sources that are not emitted from sources not near the ground (See Figure 2). ISO 9613-2 restricts its use to noise sources that are no more than 30 meters above the receiver per Table 5 in Section 9, Accuracy and Limitations. A wind turbine on a ridge is not within those limits.

This method is applicable in practice to a great variety of noise sources and environments. It is applicable, directly or indirectly, to most situations concerning road or rail traffic, industrial noise sources, construction activities, and many other ground-based noise sources. It does not apply to sound from aircraft in flight, or to blast waves from mining, military or similar operations.

Figure 2-ISO 9613-2 limitation to ground level noise sources

(5) At grazing angles greater than 20°, which can commonly occur at short ranges or in the case of elevated sources, soft ground becomes a good reflector of sound and can be considered hard ground. Very soft ground is less predictable and measurements of sound pressure levels above very soft ground should be avoided.

Figure 3-ANSI S12.18 on ground attenuation for elevated noise sources

ANSI-ASA\_S12.18-1994\_(R2009) Procedures for Outdoor Measurement of Sound Pressure Level, Appendix A covers additional requirements for ISO-9613-2 models.

Appendix A includes the statement at A.3.2 (5) Class-

ification of Ground Surfaces that: "At grazing angles greater than 20 degrees, which can commonly occur at short ranges or

in the case of elevated sources, soft ground becomes a good reflector of sound and can be considered hard ground." (See as shown in Figure 3.) Hard ground requires the input setting to be 0.0. The use of the proper ground reflection value would result in an increase of 2 or more dBA at the residential properties closest to the wind

turbines. Thus, the input value used by Tetra Tech will cause the model to under predict the sound level at those properties by 2 or more dBA. Tetra Tech's claim

that its use of 0.5 for ground absorption makes its results conservative is incorrect. The predicted levels are lower than what they would be if the proper input parameters were used.

ISO 9613-2 was not designed for wind turbines, and it was not designed for sound sources at a height of a ridgeline, such as that proposed for the Project. Its frequent use by acoustical consultants working for wind turbine utility developers does not alter that fact. The problems with using Cadna/A (operating in ISO 9613-2 mode) were acknowledged by the DEP's consultant, Warren Brown of EnRad Consulting, in an internal conference call last March on the subject of noise in wind power applications pending before the DEP. In the Notes of March 5, 2009 DEP Conference Call between Warren Brown, Dora Mills, Maine Center for Disease Control ("MCDC"), and others (submitted as evidence in Oakfield's Power's Trust Exhibit 4), Warren Brown stated that he "has issues with [the] model being used. Currently it's based on industrial noise, not wind power noise. We haven't been able to determine whether this model is accurate for wind turbines."

The concerns expressed by Warren Brown in the conference call are reflected in credible scientific literature on the subject. For example, Frank H. Brittain & Marlund E. Hale, in their article, "Some Limitations of Ray-Tracing Software for Predicting Community Noise from Industrial Facilities," NOISE-CON, Dearborn, Michigan (July 28-30, 2008) (Power's Trust Exhibit 5, Oakfield, ME), state that ISO 9613 estimates the accuracy of A-weighted sound propagation noise for distances only up to 1 km, but it is routinely, albeit incorrectly, used for distances greater than that.

If done properly, as a combined spherical and cylindrical model, the results of Tetra Tech's study would show that the DEP noise regulations would be violated by the project.

**Line source v. point source**

EnRad appears to accept Tetra Tech's assertion that their model includes provisions for both spherical (a point source with decay rate of 6 dB per doubling of distance) and cylindrical (a line

During low-level jet streams, it has been shown that the classical theory of spherical wave propagation may not hold at very large distances from a sound source. The presence of such anomalous meteorological conditions can cause sound rays to curve downward back towards the ground, where they are then reflected upwards towards the gradient. This process then repeats, leading to a trapped sound wave. This wave refraction effect results in the convergence of modified cylindrical wave spreading that has a reduced rate of sound attenuation, which may influence receivers located immediately downwind of sound sources. While the Maine DEP does not specifically require or suggest that these meteorological conditions be explicitly addressed in modeling assessments, ISO 9613-2 includes a methodology to account for effects produced under these conditions and so they were addressed in this assessment. Though expected to be somewhat infrequent, operational sound levels resulting from anomalous meteorological conditions were considered in the modeling analysis approach to ensure a conservative acoustic assessment. At short to medium range distances and for elevated sound sources such as a wind turbine, the effects of anomalous meteorological conditions on sound propagation are relatively minor.

source with decay rate of 3 dB per doubling of distance) propagation and decay of sound. This assertion is presented in the first report from Tetra Tech as shown in Figure 4. While the initial discussion acknowledges that wave refraction results in the convergence of a modified

Figure 4-Excerpt from Tetra Tech report on ISO 9613-2 and cylindrical spreading

cylindrical wave, as reported by James Hawkins in his 1986 study of infrasound

propagation from a wind turbine "Application of Ray Theory to Propagation of Low Frequency Noise from Wind Turbines," and in the Hubbard and Shepherd 1990 NASA Study "Wind Turbine Acoustics." Tetra Tech claims that the ISO 9613-2 procedure provides for this in its algorithms. That is not correct. A review of ISO 9613-2 (1996) shows that there are no provisions for cylindrical spreading in the standard. While the standard does have corrections for refracted sound, that is limited to the effects of walls and ceilings on buildings. ISO 9613-2 does not 'automatically' use line source (cylindrical spreading at 3 dB per doubling of distance) calculations in place of point source (spherical spreading at 6 dB per doubling of distance) calculations as indicated by Tetra Tech in their report. This is one more factor that leads to the Tetra Tech study understating the true impact of the wind project on the nearby residents.

The need to consider cylindrical spreading in the calculation of sound propagation from wind turbines has been previously discussed with EnRad by this author. The reason for this concern is that there are many papers published that show the need to consider the reduced decay rate of sound when conditions support the use of cylindrical spreading formulas instead of spherical spreading. Yet, EnRad remains reluctant to make this a requirement. Cylindrical spreading is needed to address several conditions that are characteristic of ridge mounted wind turbines including:

1. Arrangement in a linear manner along the mountain ridge which is similar to the conditions of modeling highways and railroad operations with long strings of noise sources.
2. Coherence of the sounds emitted by wind turbines which operate at similar rotational speeds thus causing sounds to combine in an additive manner at nodes at distances between the wind turbines and the receiving locations. And,
3. Studies that have shown that the infra and low frequency sounds emitted by wind turbines propagate in a cylindrical manner even when the turbines are not arranged in a line.

The attachment to this report by Dr. John Harrison addresses the methods needed to implement a combined spherical and cylindrical model for sound propagation to address coherence. It references a study for the Swedish Energy Agency titled: "Long-Range Sound Propagation over the Sea with Application to Wind Turbine Noise" that is also attached. Dr. Harrison provides the additional information to use the propagation formulas from the Swedish study to land based turbines. This

formula is not part of ISO 9613-2. The report titled: "Application of Ray Theory to Propagation of Low Frequency Noise from Wind Turbines," by James Hawkins for NASA in 1987 discusses the need for cylindrical propagation to be considered as a special case for wind turbine infra and low frequency sound. This is also not considered in the ISO 9613-2 standard.

In short, Tetra Tech's claims that their model includes consideration of cylindrical spreading because they have based it on the ISO 9613-2 document is not supported. There are additional factors that must be considered that will result in the sound level predictions of Tetra Tech to understate the sound levels that will be received at the nearby residential properties. Had the Tetra Tech model included these corrections it would have shown that the turbines will exceed the MDEP limits at the nearby residential properties.

#### **Model Accuracy and the Stetson Mountain validation report**

Tetra Tech attempts to support its claim of model validity by referencing a study titled: "Stetson Wind Project Operations Compliance Sound Level Study (e.g. the "Stetson Report"). I have previously commented on the conceptual and methodology flaws of that project in a report for the Oakfield project. I have attached that report: "Comments on Oakfield Wind Project" dated January 7, 2010 to Rufus Brown. The concerns raised in that report are incorporated into this report by reference.

#### **Atmospheric stability**

Tetra Tech asserts that the effect of temperature inversions, which increase the noise received at distant properties are not common and therefore the effects of increased noise is of "little concern"

Conversely, there may be anomalous meteorological conditions from time to time that are more favorable to the propagation of sound. These meteorological conditions include wind speeds increasing significantly within the low levels of the atmosphere (i.e., low-level jet stream) or strong temperature gradients (temperature inversions), commonly referred to as anomalous meteorological conditions. Temperature inversions that occur at 100 meters or lower generally effects that are uniform in all directions from the source, whereas strong wind gradients will affect receptors primarily in the upwind and downwind directions. There is insufficient data to accurately determine the prevalence of such anomalous meteorological conditions at the project site. Temperature inversions are most commonly caused by radiative cooling during the evening and night on cloudless nights with calm or very low-level wind speeds. These conditions are not conducive to wind turbine operation as wind speeds must be above cut-in wind speeds, roughly 4 to 3 mph (4-11 mph). Therefore, the effect of temperature inversions on wind turbine sound propagation is typically of little concern.

(See Figure 5, highlights).

The assumption that wind turbines will not operate during such conditions ignores the common occurrence of calm winds at the ground level while wind speeds at the hub and blades is more than adequate to power the wind

turbines. In a paper by Clifford P. Schneider

**Figure 5-Excerpt from Tetra Tech Report on Temperature Inversions**

presented at the 2009 Inter-noise conference in Ottawa, Canada titled: "Measuring Background Noise With An Attended, Mobile Instrumentation During Nights With Stable Atmospheric Conditions" it is shown that these conditions are present as much as 40% of the nights during warm summer months and 30% of the time during other months. This is not an infrequent situation. To ignore its effects by asserting it is of "little concern" as Tetra Tech does in its report demonstrates a lack of knowledge about weather effects that should be well understood by acoustical consultants.

Since this condition leads to wind turbines operating at maximum sound output while there is no wind at the ground level to induce leaf rustle or other types of masking sounds that might offset the noise from the wind turbines it is often the precise time that complaints about wind turbine noise are filed by residents. In a report titled: "Effects of the wind profile at night on wind turbine sound" by G. P. Van den Berg it is noted that: "...measurements show that the wind speed at hub height at night is up to 2.6 times higher than expected, causing a higher rotational speed of the wind turbines and consequentially up to 15 dB higher sound levels, relative to the same reference wind speed in daytime." Tetra Tech should be aware of the research available on both atmospheric stability and the pulsating noise that is

# Acoustic Solutions

synchronized with blade rotation referred to as "blade swish or thump" associated with wind turbines operating during temperature inversions.

These noise pulses can often exceed the MDEP criteria of 6 dBA which requires application of SDRS penalties. Both Tetra Tech and EnRad appear to be unwilling to accept the results of independent research showing that SDRS is a common characteristic of wind turbine noise emissions and that under commonly occurring conditions it can exceed the MDEP criteria of Chapter 375 which require application of a penalty for operation noises. Yet, ignoring it does not make the problem go away. What it does is continue that process of issuing permits to build wind projects that will ultimately produce complaints about annoyance and sleep disturbance.

Recent experience with the wind turbines on the island of Vinalhaven, ME support my position. Weather data for the July 17/18, 2010 complaint night show that the ground level winds were under 2 meters per second (calm) and the hub height winds were sufficient to power the wind turbines and produce sound levels that exceeded the levels predicted by the computer model used for that utility in spite of the fact that all three turbines were operating in Noise Reduced Operating Modes (NRO).

Tetra Tech's assessment of this condition, which has been present during many complaints filed with not only MDEP but other agencies in other states and provinces of Canada, shows either a lack of practical knowledge about weather and wind turbine noise or an attempt to downplay the conditions that are most likely to cause complaints in order to avoid the need to address them in the application process.

## SDRS FROM WIND TURBINES

Tetra Tech asserts that Short Duration Repetitive Sounds (SDRS) from wind turbines is not expected

B. **Short Duration Repetitive Sound (SDRS).** Chapter 375 §10(6)(19) defines short duration repetitive sound as "a sequence of repetitive sounds which occur more than once within an hour, each clearly discernible as an event and causing an increase in the sound level of at least 6 dBA on the fast meter response above the sound level observed immediately before and after the event, each typically less than ten seconds in duration, and which are inherent to the process or operation of the development and are foreseeable." Tetra Tech reviewed two studies regarding the occurrence of SDRS, one entitled "The Assessment and Rating of Noise from Wind Farms" by the Working Group on Noise from Wind Turbines, ETSU Report for the United Kingdom Department for Trade and Industry dated September 1996, and another report entitled "Research into Aerodynamic Modulation of Wind Turbine Noise: Final Report" by the University of Salford dated July 2007. ¶

to be a problem for the Spruce Mountain project. In support of this assertion they reference two papers from the U.K. as seen in the excerpt from their report in Figure 6. Tetra Tech has used these reports to support its decision to not

Figure 6-Excerpt from Tetra Tech Report on SDRS

include the effects of SDRS in its predictions. However,

Tetra Tech does not disclose that both of these reports are under serious challenge by acoustical consultants in the U.K. and elsewhere. The ETSU-R-97 standard was developed for use with the prior generation of smaller wind turbines which did not exhibit the blade swish and thumping associated with the industrial scale wind turbines of the type to be used at Spruce Mountain. Further, information obtained under the Freedom of Information Act (FOIA) by the Renewable Energy Fund (REF), shows the Salford University study misrepresented the findings of the studies it used to reach its conclusions. The Renewable Energy Fund (REF), which submitted the FOIA, has summarized the flaws in the Salford study. A copy of the REF document is attached to this report.

SDRS of 5-6 dBA is common for wind turbines (with SDRS of 10 to 15 dBA or more observed as a less frequent maximum), especially during periods of turbulence due to weather fronts or

## Acoustic Solutions

topography and during temperature inversions where the wind shear does not follow a simple gradient from ground to heights above the upper reach of the turbine blades, and that these conditions have been documented and reported in research papers by Hubbard and Shepherd in the 1990's (Wind Turbine Acoustics) and more recently by Dr. Van den Berg (see reference above) it cannot be assumed that the Spruce Mountain project wind turbines will not exhibit SDRS. Blade swish and thump, also referred to as amplitude modulation, is discussed in papers at annual conferences all around the world. If this is a condition that is infrequent or limited to a few makes and models of wind turbines why are there so many research papers published investigating it?

Further, the draft Order implies that periodic exceedances of the MDEP criteria are acceptable based on Tetra Tech's unsupported assertions and EnRad's acceptance of them as sufficient: "EnRad reviewed the information supplied by the applicant and stated that the project is not anticipated to generate SDRS sounds on a regular basis." (*Emphasis added*) This conclusion is not a proper reading of the compliance procedure in Chapter 375. All that is required to establish non-compliance is a single one hour exceedance of the noise limits. There is no requirement that the complainant show a continuing problem. The wording of this Order implies that periodic non-compliance may be acceptable.

The failure of MDEP to require that the effects of SDRS and temperature inversions on the sound propagation, receiving property sound levels, and the annoyance potential of the sound be considered when assessing the Spruce Mountain project is an egregious error given the considerable information available showing that they are both common occurrences and are both frequently mentioned during complaints as the reason for the complaint.

### INFRASOUND

Tetra Tech asserts that there will be no infra sound emitted by the wind turbines or received at the adjacent residential properties. In support of this assertion Tetra Tech references a study done by the Hayes McKenzie Partnership for the U.K. Department of Trade and Industry (DTI). Figure 7d is

A recent published study by the United Kingdom Department for Trade and Industry (DTI), which investigated sound levels at several operating wind energy facilities, was reviewed by Tetra Tech. This extensive study concluded that there was no evidence that infrasound emitted by wind turbines were at levels to be of concern for adverse health effects, though a condition referred to as acoustic amplitude modulation was identified in isolated situations. The study states that "the dominant character of the combined aerodynamic noise as described above is therefore a 'swish', which is familiar to most people who have stood next to a large wind turbine. Blade swish is not completely steady, but is modulated (fluctuates) at the rate at which the blades pass a fixed point, i.e. there is a cycle of increased and then reduced level which occurs typically at the blade passing frequency of around once per second." A second study, commissioned by England's University of Salford<sup>1</sup> to further investigate this phenomenon, confirmed that the instances of acoustic amplitude modulation were in fact quite low.

an excerpt from their report with this assertion.

Again, Tetra Tech is using a reference that has been discredited due to tampering with the recommendations by the DTI after the draft report was submitted by

Figure 7-Tetra Tech's reference to DTI study by Hayes McKenzie Partnership and Salford University Report subject to FOIA findings of tampering with conclusions by DTI staff

the Hayes McKenzie Partnership. A FOIA request to the DTI by the U.K. found that the referenced report had been altered to change

its conclusions. I have attached the Den Brook Judicial Review Group comments on the Hayes McKenzie Partnership's "wind turbine noise" report to support this finding. The assertion that there is no significant infra sound emitted by wind turbines has been debunked in numerous papers presented at conferences on wind turbine noise held around the world. These papers show that the majority of the acoustic energy emitted by wind turbines occurs in the frequency range from 0 Hz to about 200 Hz with the SPL being a maximum at the lowest frequency and gradually dropping as the frequency increases. When measured using instrumentation that can track the true wave form of the wind turbine sound it has been established by studies by this author that the peak SPL of sound in the range of 0-10Hz exceeds 90 dB.

**Scientific Solutions**

Page 7

*Subject: Draft Order For Application of Spruce Mountain LLC Project**Sept. 20, 2010*

Levels of infra sound 90 dB SPL and higher are perceptible to a segment of the population that has more sensitive hearing than the median population. A study by Dr. Van den berg in 2004 titled: "Low Frequency Noise and Vibration and its Control" found infrasound levels near turbines exceeding levels of 90 to 100 dB SPL in the range from 0 to 10Hz. Dr. Van den berg concludes that such levels are not likely to be perceptible to most people. Had he had the more detailed data available from the type of study conducted by Wade Bray, of Head Acoustics, for this author at a home in Ubyly, Michigan, he would have had to conclude that they were perceptible to a small portion of the population. The research confirming high levels of infrasound with complex tones and modulations and the widespread complaints about infra and low frequency sound from wind turbine utilities located around the world all point to a real and serious problem with wind turbines that should not be ignored when considering applications for new projects.

A recent study by Dr. Alec Salt demonstrated that the auditory and vestibular system is more sensitive to infra sound than has previously been known. (See "Scientist Challenges the Conventional Wisdom That What You Can't Hear Won't Hurt you." and "Responses of the ear to low frequency sounds, infrasound and wind turbines") The sounds emitted from wind turbines in the infra and low frequency range are complex modulated tones. It is inappropriate to compare the perceptibility of such complex sounds to the perception of a pure tone under laboratory conditions which were used to establish the tables and charts for the Threshold of Perception. Such complex sounds are more readily perceived and will be more of a problem indoors, especially at night in quiet bedrooms, than outdoors due to the quiet background sound levels inside a home at night during sleeping hours and resonance that can cause the sound levels to be higher inside the home than outside. This has been discussed in the Hubbard and Shepherd NASA studies, which EnRad has reviewed, and other papers on wind turbine noise as a source of concern when locating wind turbines near residential properties.

The statement that wind turbines do not produce significant infra sound that originated in the British Wind Energy Associations trade whitepapers circa 2004 and attributed to Geoff Leventhall has been disproven many times, yet the wind industry and its consultants continue to promote it as though it is a well accepted fact. It is not a fact, it is a misrepresentation of fact.

#### **TURBINE CONFIGURATION AND USE OF NOISE REDUCTION OPERATING MODES (NRO)**

This reviewer agrees with EnRad that the turbines most likely to cause exceedances of the MDEP rules and complaints from the residents are turbines 9, 10 and 11. This reviewer does not agree that operating those turbines in Noise Reduced Operating Modes will be sufficient to justify an operating permit. Given the discussions above showing that the supposedly conservative predictions of noise at the residential properties claimed by Tetra Tech are not supported by independent research and that the sound levels at those properties will be higher than predicted while at the same time the winds at the residential properties will not be sufficient to cause wind induced noise on many nights it is clear that a reduction of only a few dBA will not suffice to protect the properties.

Further, the experience with wind turbines located on the island of Vinalhaven show that NRO modes do not reduce the sound levels under real world conditions when turbulence is involved. At Vinalhaven, the presence of turbulence at the blade height combined with a temperature inversion that causes the wind shear to be unstable results in the sound levels being up to 5-8 dBA higher than the sound level of the wind turbines operating during the daytime when there is less turbulence, no temperature inversion, and NRO modes are not required. This situation should be a warning to MDEP that there are limits to the utility of NRO modes. They do not work to reduce the blade swish noises associated with turbulence and unstable wind shear.

Given the findings and observations in this report showing that the Tetra Tech sound predictions are not conservative, but instead seriously understate the impact on the residential properties the three turbines that are targeted for reduced nighttime operation should be eliminated or relocated to a site that is more distant from the residential properties.

#### CONCLUSION

Tetra Tech concludes its first report by stating that: "Project sound levels will be consistent with sound generated by wind energy facilities in the State of Maine and throughout the continental United States that have been successfully sited by employing similar noise criteria." To the extent that Spruce Mountain's noise emissions will be similar to the other "wind energy facilities in the State of Maine and throughout the continental United States" it is only because those other facilities are also causing community complaints.

If the model had corrected the deficiencies noted in this report it would shown that the project does not meet the MDEP criteria.

It is only necessary to consider the current situations at Mars Hill, Maine and Vinalhaven, Maine to see examples of wind projects that were promoted by their developers and acoustical consultants as being compatible with the residential properties abutting the turbine project but are resulting in complaints from nearby property owners. Around the US and Ontario, people are complaining about sleep disturbance and other symptoms of adverse health effects from turbines located near their homes. Every one of those projects had studies of the type submitted by Tetra Tech showing that sound levels would meet MDEP criteria and be compatible with the community. The combined experiences of all those projects does not support Tetra Tech's conclusion, instead they support the need for further restrictions on the location and operation of industrial scale wind turbines at Spruce Mountain.

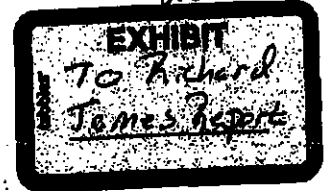
Sincerely,  
E-Coustic Solutions

  
Richard R. James, INC.



# E-Coustic Solutions

Noise Control ■ Sound Measurement ■ Consultation  
Community ■ Industrial ■ Residential ■ Office ■ Classroom ■ HIPPA Oral Privacy  
P.O. Box 1129, Okemos, MI, 48805  
rickjames@e-coustic.com



Richard R. James  
Principal  
Tel: 517-507-5067  
Fax: (866) 461-4103

January 7, 2010

Rufus E. Brown, Esq.  
Brown & Burke  
85 Exchange Street, Suite 201  
P.O. Box 7530  
Portland, ME 04101

## RE: Comments on Oakfield Wind Project

The Stetson Wind Project Operations Compliance Sound Level Study (the "Stetson Report") is flawed and provides no support for the claim that it validates the noise modeling of Resource Systems Engineering ("RSE"), the entity that prepared the Sound Level Assessment for the Oakfield Wind Project.

Among the reasons that it is flawed for purposes of validating RSE's sound modeling are the following:

- (1) It is not a report by an independent expert; the modeler's are checking their own model;
- (2) There was no testing protocol established in advance of the field work to guide the field work or to measure the legitimacy of the findings of the field work;
- (3) The field testing took place at different sites that do not correspond to the pre-construction modeling sites;
- (4) Only one field testing site was downwind of the turbines, even though downwind represents the condition most likely to result in the highest sound levels;
- (5) In contrast to the Mars Hill four quarter post- construction noise study, the testing for Stetson took place over a period of less than 24 hours;
- (6) The Stetson Report did not field test under the same conditions assumed in the pre-construction modeling;
- (7) There are numerous anomalies in the field testing, casting serious doubt about the Report, including results showing an increase in sound levels at a time when wind turbines were declining in power output and results showing variations in sound levels where constant sound power was presumed;
- (8) The modeling purported to be validated did not use line source sound propagation although the turbines are arranged in a line along the ridge top; and
- (9) There was no test data reported or filed addressing concerns about low frequency sound.

Thank you for the opportunity to comment.

Sincerely,  
For: E-Coustic Solutions

Richard R. James, INC.